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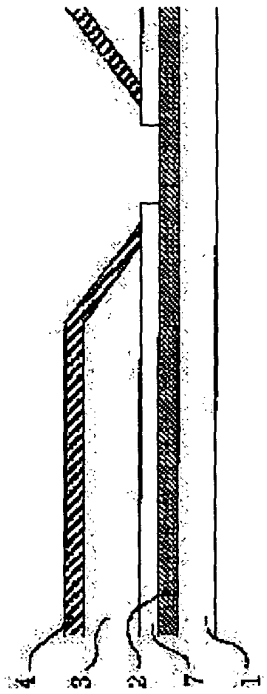
(54) LIQUID CRYSTAL DISPLAY DEVICE AND ITS PRODUCTION

(57)Abstract:
PROBLEM TO BE SOLVED: To prevent the electrolytic corrosion reaction of a transparent electrode and a reflection electrode by forming a reflection part and a transmission part with electrode materials and partially or entirely superposing the electrode materials by way of an interlayer film in the boundary region between them.
SOLUTION: A reflection part and a transmission part comprise electrode materials and electrode materials are partially or entirely superposed by way of an interlayer film 7 in the boundary region between them. In order to prevent the direct contact of ITO 2 as the electrode material constituting the transmission part with Al/Mo 4 as the electrode material constituting the reflection part in the boundary region between the transmission part and the reflection part, the interlayer film 7 and the reflection electrode material 4 are patterned, accordingly a photoresist is removed without causing electrolytic corrosion between the ITO 2 as the transparent electrode material and the Al/Mo 4 as the reflection electrode material. When electric charges applied to a liquid crystal layer in the transmission part are somewhat reduced without hindrance, the interlayer film 7 may be formed on the entire surface of the ITO 2 as the electrode material constituting the transmission part.



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CLAIMS

[Claim(s)]
[Claim 1] In the liquid crystal display with which it comes to form the pixel electrode which constitutes the reflective section which reflects outdoor daylight on the substrate of the one side of the substrates of the couple which counters mutually and is arranged on both sides of a liquid crystal layer, and the transparency section which penetrates the light from the source of a back light in 1 pixel The aforementioned reflective section and the transparency section are a liquid crystal display which an electrode material comes to constitute and is characterized by for these electrode materials superimposing a part or all, and forming them through an interlayer film in a mutual border area, respectively.
[Claim 2] The manufacture method of a liquid crystal display of coming to form the pixel electrode which constitutes the reflective section which reflects outdoor daylight on the substrate of the one side of the substrates of the couple which counters mutually and is arranged on both sides of the liquid crystal layer characterized by providing the following, and the transparency section which penetrates the light from the source of a back light in 1 pixel. the above -- the process which carries out patterning of the transparent-electrode material, and forms it on the substrate of one side including the field which constitutes the transparency section even if few the above -- the process which carries out patterning of the interlayer film and forms it on the aforementioned transparent electrode including the field which constitutes the reflective section even if few, and the process which carries out patterning of the reflector material to the field which constitutes the reflective section on the aforementioned interlayer film, and forms it in it

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the liquid crystal display used for the camcorder/movie equipped with OA equipment, such as a word processor and a personal computer, pocket information machines and equipment, such as an electronic notebook, or the liquid crystal display monitor etc., and its manufacture method.
[0002]
[Description of the Prior Art] In recent years, the liquid crystal display is widely used for a word processor, a personal computer, television, a video camera, a still camera, a mounted monitor, pocket OA equipment, the handheld game machine, etc. taking advantage of the feature of being a low power, with the thin shape.
[0003] A transparency [which used transparent electrodes, such as ITO (Indium Tin Oxide), for the pixel electrode] type liquid crystal display, and the reflected type liquid crystal display which used reflectors, such as a metal, for the pixel electrode are shown in such a liquid crystal display.
[0004] Originally, liquid crystal displays differ in CRT (Braun tube), EL (electroluminescence), etc., since they are not the spontaneous light type display which emits light itself, in the case of a penetrated type liquid crystal display, arrange lighting systems, such as a fluorescence pipe, and the so-called back light behind a liquid crystal display, and show to it by the light by which incidence is carried out from there. Moreover, in the case of a reflected type liquid crystal display, it is displaying by reflecting the incident light from the outside by the reflector.
[0005] Without being influenced so much by the surrounding luminosity, in order to display here using a back light as mentioned above in the case of a penetrated type liquid crystal display, although it has the advantage that the display which is bright and has high contrast can be performed, since a back light consumes 50% or more of the total power consumption of a liquid crystal display, it also usually has the problem that power consumption will become large.
[0006] Moreover, in the case of the reflected type liquid crystal display, although it has the advantage that power consumption can be made very small in order not to use a back light as mentioned above, it also has the problem that the luminosity and contrast of a display by a surrounding operating environment or surrounding service conditions, such as a luminosity, will be influenced.
[0007] Thus, in the reflected type liquid crystal display, when operating environments, such as a surrounding luminosity, especially outdoor daylight were dark, it had the fault that visibility fell extremely, and also in the one transparency type liquid crystal display, with this, when outdoor daylight was very bright conversely, it had the problem that the visibility under fine weather etc. will fall.
[0008] As a means for solving such a trouble, the liquid crystal display having the function of both a reflected type and a penetrated type is proposed by Japanese Patent Application No. No. 201176 [nine to] etc. The liquid crystal display proposed by this patent application By making the reflective section which reflects outdoor daylight in one display pixel, and the transparency section which penetrates the light from a back light, when the circumference is pitch-black As a penetrated type liquid crystal display which displays using the light which penetrates the transparency section from a back light, when outdoor daylight is dark As a two-ways type liquid crystal display which displays using both the light which penetrates the transparency section from a back light, and the light reflected by the reflective section formed with the comparatively high film of the rate of a light reflex Furthermore, when outdoor daylight is bright, it is the reflective transparency two-ways type liquid crystal display of the composition that it can use as a reflected type liquid crystal display which displays using the light reflected by the reflective section formed with the comparatively high film of the rate of a light reflex.
[0009] The liquid crystal display of such composition is not concerned with the luminosity of outdoor daylight, but in order to realize bright high color display of color purity with both a penetrated type and a reflected type, it needs to

make the luminous intensity scattered about in the direction perpendicular to the display screen increase to the incident light from all angles, although it enables offer of a liquid crystal display in which visibility was always excellent. For that purpose, it is required to produce the reflecting plate which has the optimal reflection property, and it is necessary to form the reflecting plate which formed the irregularity controlled since it had the optimal reflection property in the front face of the substrate which consists of glass etc., and formed on it the thin film which consists of a metal membrane etc.

[0010] Two or more heights are formed by applying a photopolymer on a substrate, and heat-treating as a method currently enforced, for example, after minding a shading means by which the circular shading field was arranged and exposing and developing a photopolymer. And it is the method of forming an insulator protective coat in accordance with the configuration of the convex section of these heights, and forming the reflecting plate which consists of a metal thin film on the insulator protective coat.

[0011] Moreover, generating of the duplex projection under the influence of the glass thickness which poses a problem by forming a reflecting plate in the outside (a liquid crystal layer being an opposite side) of a substrate is solved by forming a reflecting plate in the interior of a substrate, and carrying out to a pixel electrode and the structure as which it serves, i.e., a reflector.

[0012]

[Problem(s) to be Solved by the Invention] In the liquid crystal display which displays using the conventional reflected light which was mentioned above, of course, it is desirable to constitute from material with a reflection factor high as a reflector, and although Ag from the meaning is the optimal, since Ag is material with the high diffusion coefficient to Si layer, the problem of the diffusion and the reaction to a ground is large [Ag].

[0013] On the other hand, the possibility of aluminum of the diffusion and the reaction to a ground is small, and it is widely used for the metallization in an integrated circuit, and since properties, such as etching conditions, are also good, aluminum is used for a reflector in many cases. And when **********ing the reflector film by such aluminum and forming a reflector, the wet etching method which makes etchant the etching reagent which consists of nitric-acid + acetic-acid + phosphoric-acid + water is applied.

[0014] Moreover, many ITO(s) are used for the transparent electrode section in the Prior art mentioned above, and in order to remove the photoresist (resist) used with the photo lithography technology at this time, the ablation liquid of an amine system is used.

[0015] Here, the border area of the transparent electrode and reflector in a reflective transparency two-ways type liquid crystal display which was mentioned above is briefly explained using a drawing. Drawing 9 and drawing 10 are the cross sections having shown the border area of the transparent electrode and reflector in the pixel portion of the conventional liquid crystal display.

[0016] The border area of the transparent electrode and reflector in the pixel portion of this conventional liquid crystal display [whether it is in the state where ITO2 which is the transparent electrode formed on the substrate 1, and aluminum4 which is a reflector contacted electrically as shown in drawing 9 , and] Or as shown in drawing 10 , it is common that it is in the state where ITO2 which is a transparent electrode, and aluminum4 which is a reflector contacted electrically through the metal membranes 5 of further others (for example, Mo:molybdenum etc.).

[0017] However, as mentioned above, after ITO and aluminum connected electrically, it turns out that a problem as shown below arises.

[0018] It is an electric corrosion reaction produced between ITO and aluminum in the rinsing process of down stream processing called amine system ablation liquid -> rinsing for removing the resist at the time of forming a reflector. This electric corrosion reaction is a reaction produced since alkalinity becomes strong when the ablation liquid of an amine system which adhered to the substrate in the ablation tub is mixed with water by the rinse tank. That is, the problem of the front face of ITO2 which is aluminum and the transparent electrode which are because it will be soaked into an alkaline solution after ITO and aluminum had adjoined or contacted, consequently are a reflector being corroded, or ITO2 which are (electric corrosion) and a transparent electrode being returned, and carrying out melanism will arise.

[0019] Thus, in the conventional liquid crystal display, it set to the border area of the transparent electrode and reflector in a pixel portion, ITO and aluminum will be corroded and dissolved, and it had the problem of reducing the manufacture yield of a liquid crystal display sharply by this electric corrosion reaction.

[0020] this invention is made in view of the above conventional troubles, and the place made into the purpose is by preventing the electric corrosion reaction of the transparent electrode and reflector in the pixel portion of a reflective transparency two-ways type liquid crystal display to offer reflective transparency two-ways [which can raise the manufacture yield easily] type a liquid crystal display and its manufacture method.

[0021]

[Means for Solving the Problem] The liquid crystal display of this invention for attaining the purpose mentioned above

In the liquid crystal display with which it comes to form the pixel electrode which constitutes the reflective section which reflects outdoor daylight on the substrate of the one side of the substrates of the couple which counters mutually and is arranged on both sides of a liquid crystal layer, and the transparency section which penetrates the light from the source of a back light in 1 pixel The aforementioned reflective section and the transparency section are characterized by for an electrode material coming to be constituted, and for these electrode materials superimposing a part or all, and forming them through an interlayer film, in a mutual border area, respectively.

[0022] That is, according to the liquid crystal display of this invention, in the border area of the transparency section and the reflective section, the problem of the melanism by the corrosion by electric corrosion and reduction of an electrode material has been solved by considering as the structure which minded the interlayer film among them so that it may not be in the state where of the electrode material which constitutes the transparency section, and the electrode material which constitutes the reflective section connected electrically through a state or other metal membranes etc. which contacted mutually. When the electric resistance between the electrode material which constitutes the transparency section from considering as the structure through the interlayer film, and the electrode material which constitutes the reflective section becomes high and it dips into an electrolyte, as for this, it is possible to make it hard to happen electric corrosion and reduction.

[0023] Moreover, the manufacture method of the liquid crystal display of this invention for attaining the purpose mentioned above On the substrate of the one side of the substrates of the couple which counters mutually and is arranged on both sides of a liquid crystal layer In the manufacture method of a liquid crystal display of coming to form the pixel electrode which constitutes the reflective section which reflects outdoor daylight, and the transparency section which penetrates the light from the source of a back light in 1 pixel the above -- with the process which carries out patterning of the transparent-electrode material, and forms it on the substrate of one side including the field which constitutes the transparency section even if few the above -- it is characterized by having the process which carries out patterning of the interlayer film and forms it on the aforementioned transparent electrode including the field which constitutes the reflective section even if few, and the process which carries out patterning of the reflector material to the field which constitutes the reflective section on the aforementioned interlayer film, and forms it in it

[0024] Namely, according to the manufacture method of the liquid crystal display of this invention, it sets to the border area of the transparency section and the reflective section. Even if an alignment gap of a photo mask etc. occurs in the case of patterning of an interlayer film or an electrode material After the electrode material which constitutes the transparency section by forming reflector material on an interlayer film, and the electrode material which constitutes the reflective section have minded the interlayer film Amine system ablation liquid -> since it will pass through the process which removes resists, such as rinsing, when it dips into an electrolyte, it is possible to make it hard to happen the problem by electric corrosion or reduction.

[0025]

[Embodiments of the Invention] (Gestalt 1 of operation) The gestalt 1 of the operation in this invention is hereafter explained based on a drawing.

[0026] Drawing 1 is the cross section having shown the composition of the pixel portion of the liquid crystal display in the gestalt 1 of this operation, and drawing 2 (a) - (d) and drawing 3 (e) - (h) is the cross section having shown the process of the transparency section and the reflective section in a pixel portion of a liquid crystal display in the gestalt 1 of this operation.

[0027] In the transparency section and the reflective section which constitute the pixel portion of the liquid crystal display in the gestalt 1 of this operation First, as shown in drawing 2 (a), insulator layers, such as Ta2O5 and Si02, are formed as a base coat film on the insulating substrate 1 (not shown). Then, patterning of the metal thin film which consists of aluminum, Mo, Ta, etc. is created and carried out to the insulating substrate 1 by the sputtering method, and the gate electrode 8 is formed.

[0028] Next, the gate electrode 8 mentioned above is covered and the laminating of the gate insulator layer 10 is carried out on the insulating substrate 1. With the gestalt 1 of this operation, by P-CVD, 3000A laminating of the SiNx film was carried out, and it considered as the gate insulator layer 10. In addition, in order to raise insulation, the gate electrode 8 is anodized, this oxide film on anode is made into the 1st gate insulator layer 9, the insulator layers 10, such as SiN, are formed by CVD, and it is good also as the 2nd insulator layer 10.

[0029] Next, by CVD, the channel layer 11 (amorphous silicon) and the electrode contact layer 12 (the amorphous silicon or microcrystal (Si) which doped impurities, such as Lynn) are continued on the gate insulator layer 10, 500A laminating is carried out to 1500A, respectively, patterning of both the Si film of the electrode contact layer 12 and the channel layer 11 is carried out by the dry etching method by HCl+SF6 mixed gas etc., and it is formed.

[0030] Then, as shown in drawing 2 (b), 1500A laminating of the transparent electric conduction films (ITO) 2 and 13 is carried out as an electrode material which constitutes the transparency section by the sputtering method, then the

laminating of the metal thin films 14 and 15, such as aluminum, Mo, and Ta film, is carried out. And the source electrodes 13 and 14 and the drain electrodes 2 and 15 are formed by carrying out patterning of these.
[0031] Next, as shown in drawing 2 (c), after carrying out 3000A laminating of the insulator layers, such as SiN, in CVD, patterning is carried out and an interlayer film 7 is formed.
[0032] Next, two or more concavo-convex sections, the contact section, and the transparency section are formed by heat-treating, after applying the photopolymer film 3 on this interlayer film 7 and exposing and developing this photopolymer 3, as shown in drawing 2 (d).
[0033] Next, as shown in drawing 3 (e), the aluminum/Mo films 4 and 5 are formed 1000/500A thickness by the sputtering method as an electrode material which constitutes the reflective section on the substrate 1 containing an interlayer film 7 and a photopolymer 3.
[0034] And as shown in drawing 3 (f), on the electrode material which constitutes the reflective section, a photo lithography process is used and a photoresist 16 is formed at a predetermined configuration. Since Mo5 exists between ITO2 which is the electrode material which constitutes the transparency section, and aluminum4 which is the electrode material which constitutes the reflective section at this time, although an electrolytic solution sinks in from the film defective part of aluminum4 at the time of the development of a photoresist 16, since this Mo5 functions as a barrier metal, an electric corrosion reaction does not occur.
[0035] Moreover, in case patterning of the electrode material which constitutes the reflective section from a following process is carried out at this time, it is necessary to make it ITO2 in the border area of the transparency section and the reflective section and aluminum4/Mo5 not contact directly. That is, in consideration of the alignment gap with an interlayer film 7 and a reflector 4, as shown in the cross section of drawing 1 , the edge of the aforementioned photoresist 16 in the border area of the electrode material which constitutes the transparency section, and the electrode material which constitutes the reflective section carries out exposure development of the aforementioned photoresist 16 so that it may be from the edge of the aforementioned interlayer film 7 on a reflective section side.
[0036] Next, as shown in drawing 3 (g), the etchant which consists of nitric-acid + acetic-acid + phosphoric-acid + water is used, aluminum/Mo which is the electrode material which constitutes the reflective section is **********ed simultaneously, and a reflector is formed.
[0037] Finally, as shown in drawing 3 (h), the pixel portion of the liquid crystal display in the form 1 of this operation is completed by removing the photoresist 16 formed of photo lithography using the exfoliation equipment of a batch type.
[0038] Here, the exfoliation equipment of a batch type used in order to remove the photoresist 16 formed of the aforementioned photo lithography is explained using drawing 4 . Drawing 4 (a) - (c) is the schematic diagram having shown the exfoliation process of the photoresist 16 of the batch type in the form 1 of this operation.
[0039] the substrate 20 which passed through a process which was mentioned above as shown in drawing 4 (a) - (c) -- as an amine -- MEA (monoethanolamine) -- 60wt(s)% -- it soaks in the exfoliation liquid 21 to contain, and in order to remove the exfoliation liquid 21 of substrate 20 front face after that, it soaks in water 22 and rinses At this time, in process in which the substrate 20 as shown in drawing 4 (b) is conveyed from an exfoliation tub to a rinse tank, it is in the state where exfoliation liquid 21 adhered to substrate 20 front face, and by soaking this substrate 20 in a rinse tank, MEA21 and water 22 are mixed on substrate 20 front face, and alkalinity becomes strong.
[0040] Therefore, in the liquid crystal display of composition like before, since ITO2 which is the electrode material which constitutes the transparency section in the border area of the transparency section and the reflective section, and aluminum4/Mo5 which are the electrode material which constitutes the reflective section adjoin and they are constituted in case a photoresist 16 is removed, electric corrosion will arise.
[0041] However, with the form 1 of this operation, as mentioned above, it sets to the border area of the transparency section and the reflective section. Since patterning of an interlayer film 7 and the reflector material 4 and 7 is carried out so that ITO2 which is the electrode material which constitutes the transparency section, and aluminum4/Mo5 which are the electrode material which constitutes the reflective section may not contact directly as shown in the cross section of drawing 1 A photoresist 16 can be removed without causing electric corrosion between ITO which is transparent-electrode material, and aluminum which is reflector material.
[0042] In addition, even if the charge built over a liquid crystal layer in the transparency section decreases somewhat, in being convenient, it does not matter even if it forms an interlayer film 7 all over the ITO top which is the electrode material which constitutes the transparency section. In the case of such composition, it will have the advantage of becoming possible to set the retardation of the transparency section and the reflective section as an optimum value, by controlling the thickness of an interlayer film 7.
[0043] An orientation film is applied and calcinated to each of the TFT substrate which has the pixel portion manufactured as mentioned above, and the transparent opposite substrate (not shown) in which the transparent

electrode was formed. And rubbing processing is performed to this orientation film, after sprinkling a spacer, liquid crystal is poured in for both these substrates by lamination and the vacuum pouring-in method by the seal resin, and a liquid crystal display element is created. In addition, with the form 1 of this operation, in order to make it operate in the liquid crystal mode of level orientation, it set up so that each direction of rubbing might become parallel, and the dielectric constant anisotropy poured in the positive nematic liquid crystal. Finally, it installs a polarizing plate and one phase contrast board at a time in the both sides of a liquid crystal display element, respectively, a back light is installed in a tooth back, and the reflective transparency two-ways type liquid crystal display in the form 1 of this operation is completed.

[0044] (Gestalt 2 of operation) Although the gestalt 1 of operation mentioned above explained how to remove the photoresist 16 formed of photo lithography using the ablation equipment of a batch type, the gestalt 2 of this operation explains how to remove the photoresist 16 formed of photo lithography using the ablation equipment of single wafer processing.

[0045] Drawing 5 (a) - (d) is the schematic diagram having shown the ablation process of the photoresist 16 in the gestalt 2 of this operation. In addition, the same flow as the gestalt 1 of operation mentioned above will perform the manufacturing process of the liquid crystal display in the gestalt 2 of this operation except the ablation process of a photoresist 16.

[0046] the substrate 20 which passed through the process of drawing 2 in the gestalt 1 of operation, and drawing 3 as shown in drawing 5 (a) - (d) -- as an amine -- MEA (monoethanolamine) -- 60wt(s)% -- it soaks in the ablation liquid 21 to contain, and in order to remove the ablation liquid 21 of substrate 20 front face after that, it soaks in water 22 and rinses At this time, in process in which the substrate 20 as shown in drawing 5 (c) is conveyed from an ablation tub to a rinse tank, it is in the state where ablation liquid 21 adhered to substrate 20 front face, and this substrate 20 is soaked in a rinse tank, and the ** alkalinity with which MEA21 and water 22 are mixed on substrate 20 front face becomes strong by things.

[0047] Therefore, it sets to the liquid crystal display of composition like before. Although electric corrosion will arise since ITO2 which is the electrode material which constitutes the transparency section in the border area of the transparency section and the reflective section, and aluminum4/Mo5 which are the electrode material which constitutes the reflective section adjoin and they are constituted in case a photoresist 16 is removed Also in the gestalt 2 of this operation, as mentioned above, it sets to the border area of the transparency section and the reflective section. Since patterning of an interlayer film 7 and the reflector material 4 and 7 is carried out so that ITO2 which is the electrode material which constitutes the transparency section, and aluminum4/Mo5 which are the electrode material which constitutes the reflective section may not contact directly as shown in the cross section of drawing 1 A photoresist 16 can be removed without causing electric corrosion between ITO which is transparent-electrode material, and aluminum which is reflector material.

[0048] (Gestalt 3 of operation) The gestalt 3 of the operation in this invention is hereafter explained based on a drawing.

[0049] Drawing 6 is the cross section having shown the composition of the pixel portion of the liquid crystal display in the gestalt 3 of this operation, and drawing 7 (a) - (d) and drawing 8 (e) - (g) is the cross section having shown the process of the transparency section and the reflective section in a pixel portion of a liquid crystal display in the gestalt 3 of this operation.

[0050] In the transparency section and the reflective section which constitute the pixel portion of the liquid crystal display in the gestalt 3 of this operation First, as shown in drawing 7 (a), insulator layers, such as Ta2O5 and Si02, are formed as a base coat film on the insulating substrate 1 (not shown). Then, patterning of the metal thin film which consists of aluminum, Mo, Ta, etc. is created and carried out to the insulating substrate 1 by the sputtering method, and the gate electrode 8 is formed.

[0051] Next, the gate electrode 8 mentioned above is covered and the laminating of the gate insulator layer 10 is carried out on the insulating substrate 1. With the gestalt 3 of this operation, by P-CVD, 3000A laminating of the SiNx film was carried out, and it considered as the gate insulator layer 10. In addition, in order to raise insulation, the gate electrode 8 is anodized, this oxide film on anode is made into the 1st gate insulator layer 9, the insulator layers 10, such as SiN, are formed by CVD, and it is good also as the 2nd insulator layer 10.

[0052] Next, by CVD, the channel layer 11 (amorphous silicon) and the electrode contact layer 12 (the amorphous silicon or microcrystal (Si) which doped impurities, such as Lynn) are continued on the gate insulator layer 10, 500A laminating is carried out to 1500A, respectively, patterning of both the Si film of the electrode contact layer 12 and the channel layer 11 is carried out by the dry etching method by HCl+SF6 mixed gas etc., and it is formed.

[0053] Then, as shown in drawing 7 (b), 1500A laminating of the transparent electric conduction films (ITO) 2 and 13 is carried out as an electrode material which constitutes the transparency section by the sputtering method, then the

laminating of the metal thin films 14 and 15, such as aluminum, Mo, and Ta film, is carried out. And the source electrodes 13 and 14 and the drain electrodes 2 and 15 are formed by carrying out patterning of these.
[0054] Next, two or more concavo-convex sections, the contact section, and the transparency section are formed by heat-treating, after applying the photopolymer film 3 on this ITO2 and exposing and developing this photopolymer 3, as shown in drawing 7 (c).
[0055] Next, as shown in drawing 7 (d), the aluminum/Mo films 4 and 5 are formed 1000/500A thickness by the sputtering method as an electrode material which constitutes the reflective section on the substrate 1 containing this photopolymer 3.
[0056] And as shown in drawing 8 (e), on the electrode material which constitutes the reflective section, a photo lithography process is used and a photoresist 16 is formed at a predetermined configuration. Since Mo5 exists between ITO2 which is the electrode material which constitutes the transparency section, and aluminum4 which is the electrode material which constitutes the reflective section at this time, although an electrolytic solution sinks in from the film defective part of aluminum4 at the time of the development of a photoresist 16, since this Mo5 functions as a barrier metal, an electric corrosion reaction does not occur.
[0057] Moreover, in case patterning of the electrode material which constitutes the reflective section from a following process is carried out at this time, it is necessary to make it ITO2 in the border area of the transparency section and the reflective section and aluminum4/Mo5 not contact directly. That is, in consideration of the alignment gap with a photopolymer 3 and a reflector 4, as shown in the cross section of drawing 6 , the edge of the aforementioned photoresist 16 in the border area of the electrode material which constitutes the transparency section, and the electrode material which constitutes the reflective section carries out exposure development of the aforementioned photoresist 16 so that it may be from the edge of the aforementioned photopolymer 3 on a reflective section side.
[0058] Next, as shown in drawing 8 (f), the etchant which consists of nitric-acid + acetic-acid + phosphoric-acid + water is used, aluminum/Mo which is the electrode material which constitutes the reflective section is **********ed simultaneously, and a reflector is formed.
[0059] Finally, as shown in drawing 8 (g), the pixel portion of the liquid crystal display in the gestalt 3 of this operation is completed by removing the photoresist 16 formed of photo lithography using the ablation equipment of a batch type.
[0060] Also in the gestalt 3 of this operation, as mentioned above, it sets to the border area of the transparency section and the reflective section. Since patterning of a photopolymer 3 and the reflector material 4 and 7 is carried out so that ITO2 which is the electrode material which constitutes the transparency section, and aluminum4/Mo5 which are the electrode material which constitutes the reflective section may not contact directly as shown in the cross section of drawing 6 A photoresist 16 can be removed without causing electric corrosion between ITO which is transparent-electrode material, and aluminum which is reflector material.
[0061]
[Effect of the Invention] According to the liquid crystal display and its manufacture method of this invention, like the above explanation So that it may not be in the state where the electrode material which constitutes the transparency section, and the electrode material which constitutes the reflective section connected electrically in the border area of the transparency section and the reflective section through a state or other metal membranes etc. which contacted mutually By considering as the structure which minded the interlayer film among them, the problem of the melanism by the corrosion by electric corrosion and reduction of an electrode material is solved. When the electric resistance between the electrode material which constitutes the transparency section from considering as the structure through the interlayer film, and the electrode material which constitutes the reflective section becomes high and it dips into an electrolyte, as for this, it is possible to make it hard to happen electric corrosion and reduction.

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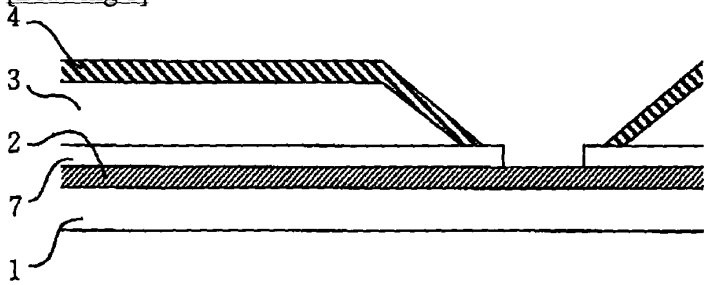
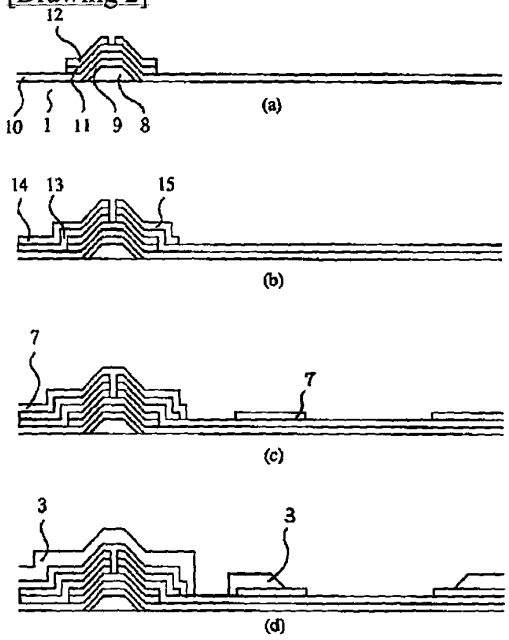
DRAWINGS

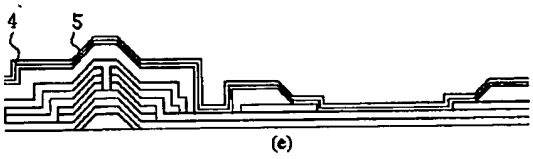
[Drawing 1]



[Drawing 2]



[Drawing 3]



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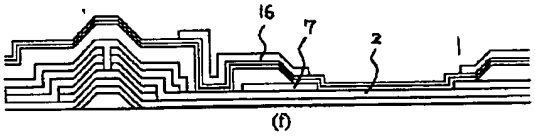
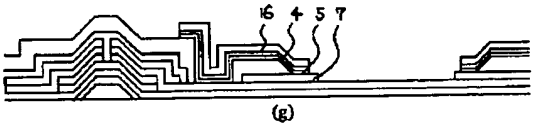
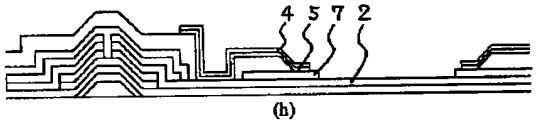


(f)

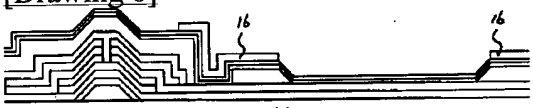


(g)



(h)

[Drawing 8]



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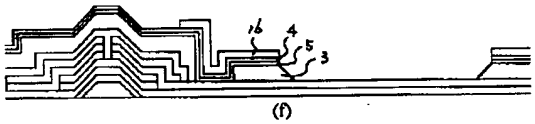

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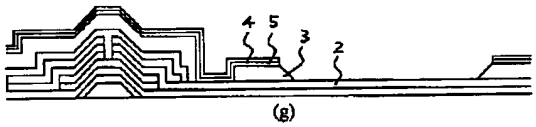
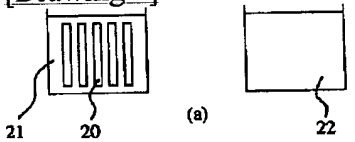
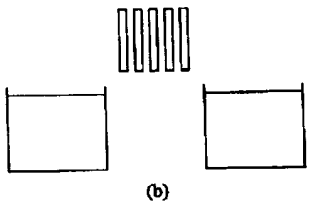
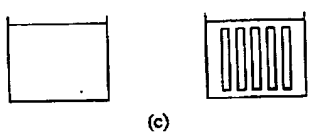


(g)

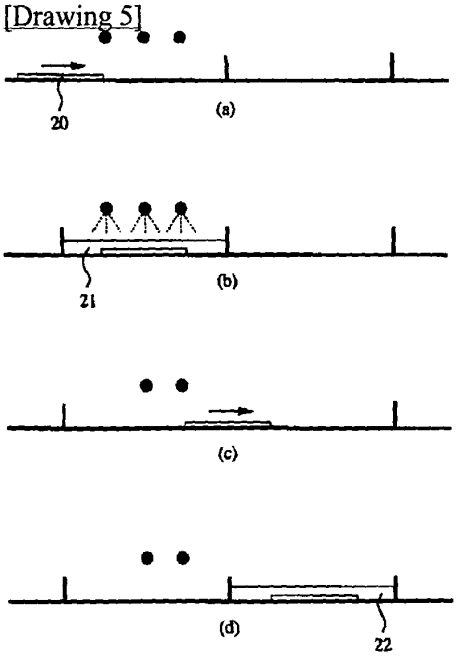
[Drawing 4]



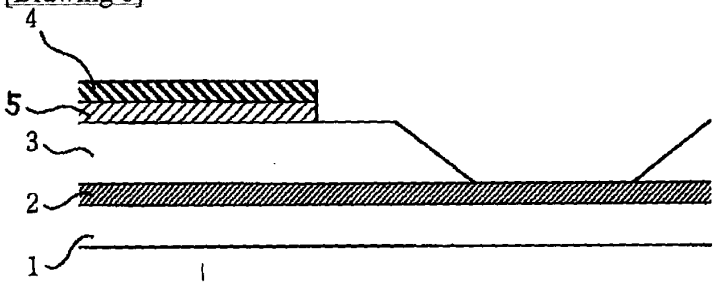

(b)


(c)

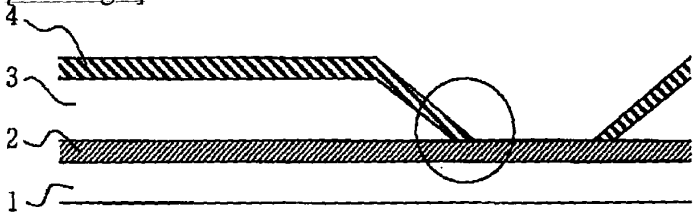
[Drawing 5]



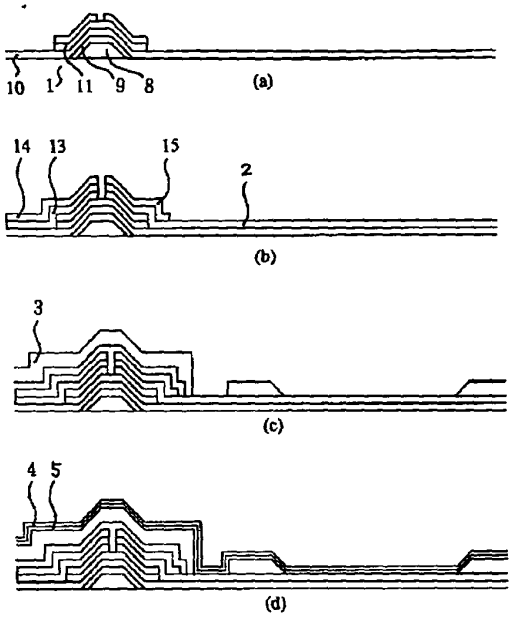
[Drawing 6]



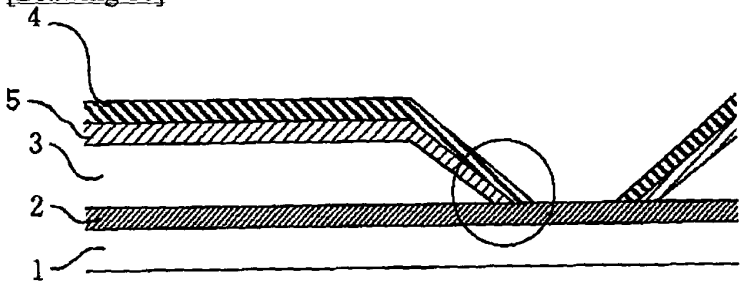
[Drawing 9]



[Drawing 7]



[Drawing 10]



[Translation done.]